Bohr-Rutherford Diagrams graphically illustrate the chemical structure of the elements of the Periodic Table. As you know, electrons are around the nucleus in orbits AND each orbit can only contain a set number of electrons. The Atomic Number tells (1) the total number of protons inside the nucleus and (2) the total number of electrons. The Atomic Mass is the total number of protons plus the total number of neutrons in the nucleus.

A detailed look at the Bohr-Rutherford Diagram for Phosphorus is provided below. The box on the left provides the Chemical Symbol (P), the Atomic Number (15) and the Atomic Mass (31). The box on the right illustrates how to determine the number of protons and the number of neutrons. The Bohr-Rutherford Diagram also shows the total number of electrons is 15. Recall: The number of protons = number of electrons. The electrons occur in three orbits. Two electrons are in Orbit 1, eight electrons are in Orbit 2 and five electrons are in Orbit 3. The outer orbit (i.e., valence) is not full. Thus, phosphorus will react with other elements to reach the maximum.

Example: phosphorus

Example 2: Fluorine

This is the Bohr-Rutherford Diagram for Fluorine (Atomic Number 9). Fluorine is the ninth element of the Periodic Table. As shown, Fluorine has nine protons (i.e., 9p) and ten neutrons (i.e., 10n). Thus, its Atomic Mass is 19. Fluorine also has nine total electrons -- two electrons in Orbit 1, seven electrons in Orbit 2. Fluorine is a very reactive Halogen Gas (i.e., it only needs one more electron to fill its outer orbit (...valence...) with the maximum number of eight electrons).
Let’s practice....

Draw the Bohr-Rutherford Diagrams for the following elements.

Calcium – Chemical Symbol is Ca, Atomic Number is 20 and Atomic Mass is 40. It would be formatted as shown.

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40  
Ca
20
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Boron

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11  
B
5
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Neon

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20  
Ne
10
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Chlorine

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35  
Cl
17
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